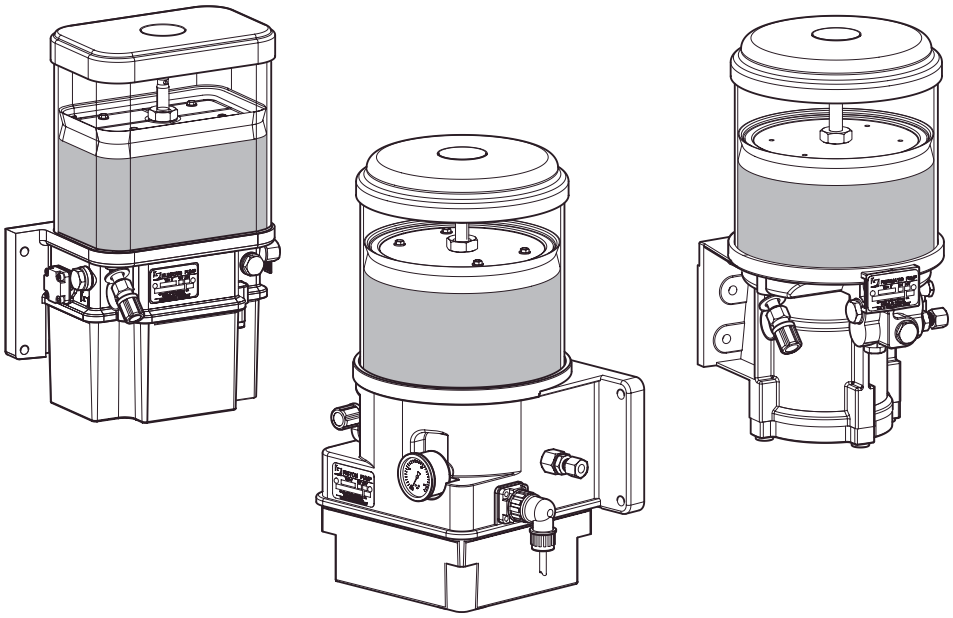
General Manual



Single Line

Automatic Greasing Systems

North American Market

EG0102

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This manual applies to the standard version of the product. Groeneveld cannot accept liability for any damage arising from the use of specifications other than that supplied.

You are requested to contact Groeneveld technical service for information concerning adjustment, maintenance work or repairs that is not described in this manual.

Whilst this manual has been prepared with the greatest possible care Groeneveld cannot accept responsibility for any errors of the concequences of such errors.

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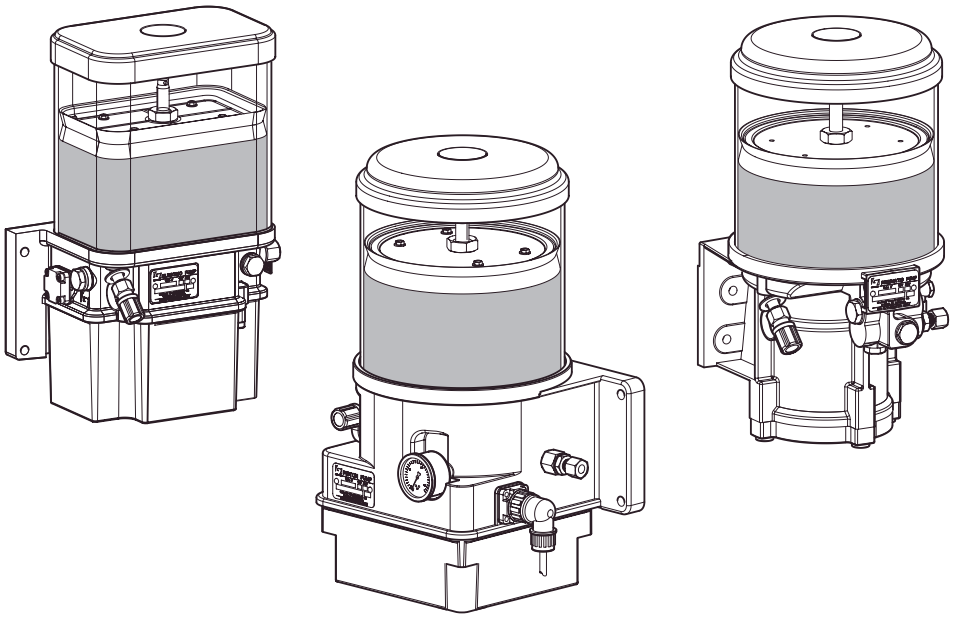
PREFACE



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This general manual is a description of the Singleline Automatic Greasing System. The intention is to provide clients with an insight into how the system works, what the possibilities are and, briefly, maintenance aspects. Furthermore, you will find the technical data of the various parts of the lubrication system in this manual.
The general manual can also be used as a user manual. The manual is built up of different sections, indicated by chapter numbers. The numbering of pages and the images re-starts with every new chapter.
In this manual, the following pictograms are used to bring an item to the user's attention or to notify the user.

ATTENTION:

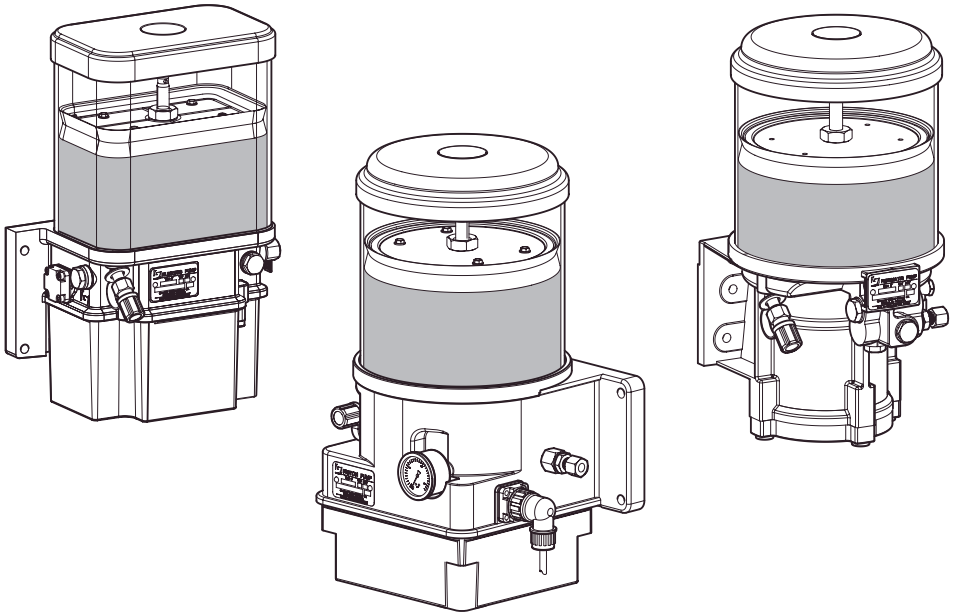
Important supplementary information is provided for the user, in the hopes of preventing errors from occurring.

WARNING:

This pictogram notifies the user when the danger of physical injury or severe damage by improper use should arise.

1.

INTRODUCTION



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This chapter is a short presentation of GROENEVELD Transport Efficiency and its products. The chapter ends with some general remarks about the Singleline greasing systems.

1.1 GROENEVELD Transport Efficiency B.V.

Investing in operational safety. With this thought in mind, GROENEVELD was founded in 1971. The present, international network is administered from its headquarters in Gorinchem. GROENEVELD strives for an expansion of its leading position, achieved by the company's solid image and customer-oriented policy.
GROENEVELD employees form a team that works every day with great enthusiam and dedication for its customers. Extensive automation makes a high working rate possible. The ISO 9001 standard is the basis for the guaranteed quality of GROENEVELD products. Frequent contact with clients and an extensive dealer network guarantee the good name of GROENEVELD.
We know what the entrepreneur needs today, not a ready-made product, but a custom-made solution for automation.
New technologies offer new applications. Therefore GROENEVELD has a large budget available for the development of new cost-saving products. Our Research and Development department not only collaborates with leading external organizations, but also with leading manufacturers of vehicles and machinery. In addition to the Automatic Greasing System, GROENEVELD also delivers products such as:

- speed limiters
- on-board computer systems
- automatic oil level controllers
- reversing protection systems
- temperature recording systems

GROENEVELD delivers a complete program of cost-saving and comfort-enhancing products.

Figure 1.1 GROENEVELD Head office

1.2 GROENEVELD Greasing Systems

GROENEVELD Automatic Greasing Systems ensure the daily maintenance of everything that has moving parts. They avoid unnecessary machinery wear and downtime and,thus,save cost and prevent exasperation.

GROENEVELD greasing systems are used by, for example, production companies, machinery used in service industries, agriculture, ships, the offshore industry and the transport industry.
In the following list are the most important advantages:

- increase of the service intervals, thus,less unnecessary down-time;
- less wear of the lubricated parts because of accurate and constant lubricating;
- reduced repair and replacement costs;
- reduced unexpected down-time;
- fewer production losses.

1.3 Single Line Automatic Greasing Systems

With a Single Line Automatic Greasing System, all lubrication points of a vehicle or machine are automatically lubricated at the correct time with the correct dose. Moreover, optimum grease or lube-oil distribution over the whole lubricating surface is achieved, because the lubrication takes place while the machinery or vehicle is in operation. Every action is automatically carried out by the system. The user needs only to refill the reservoir periodically.
The GROENEVELD Automatic Greasing Systems are designed with great care and thoroughly tested to guarantee a long and fault-free life span, under the most heavy operational conditions.
A well-functioning system requires:

- correct assembly;
- use of the prescribed type of grease or lube oil;
- a periodic check of the functionality of the system.

The periodic check can easily be carried out at the same time as the normal maintenance of the machine or vehicle. Moreover, because of the careful choice of materials, the greasing system is nearly maintenance-free.

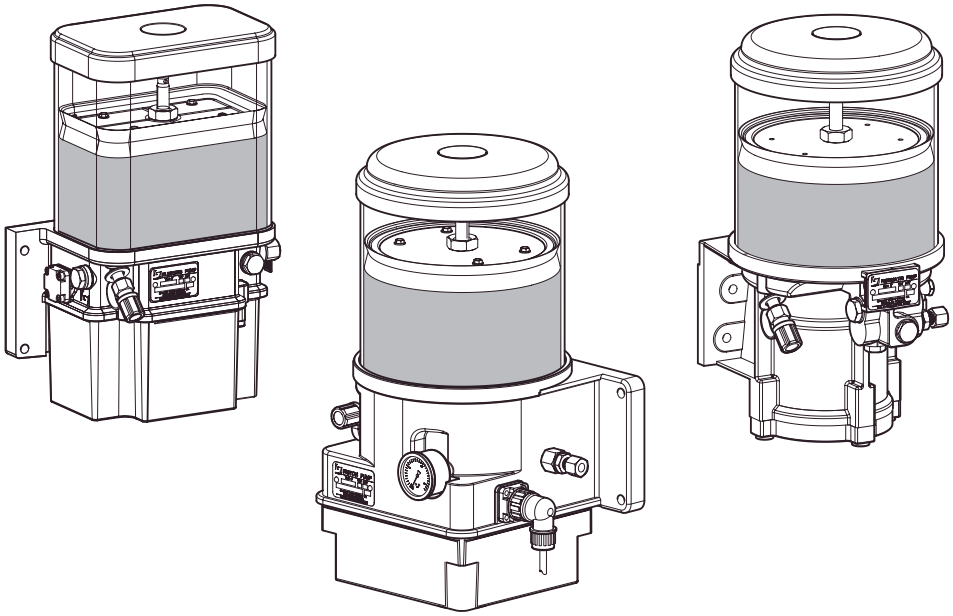
ATTENTION:

An automatic greasing system avoids the time-consuming manual lubricating of important parts. Remember, however, that there can be lubricating points that still have to be lubricated manually.

Notes

2.

CONVERSION SIZE AND WEIGHT



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2.1 Size and weight conversion

Metric	*SAE*
1 bar	= 14,7 psi
1 kilogram	= 2,2 lbs
1 cubic centimeter	= 0,061 cubic inches
1 liter	= 0,26 US gallon
1 liter	= 0,22 Imperial gallon
1 millimeter	= 0,03937 inch
1 psi	= 0,068 bar
1 lbs	= 0,454 kilogram
1 cubic inch	= 16,4 cubic centimeter
1 US gallon	= 3,79 liters
1 Imperial gallon	= 4,55 liters
1 inch	= 25,4 millimeters
Celsius	= (°F - 32) + 1,8
Fahrenheit	= (°C x 1,8) + 32

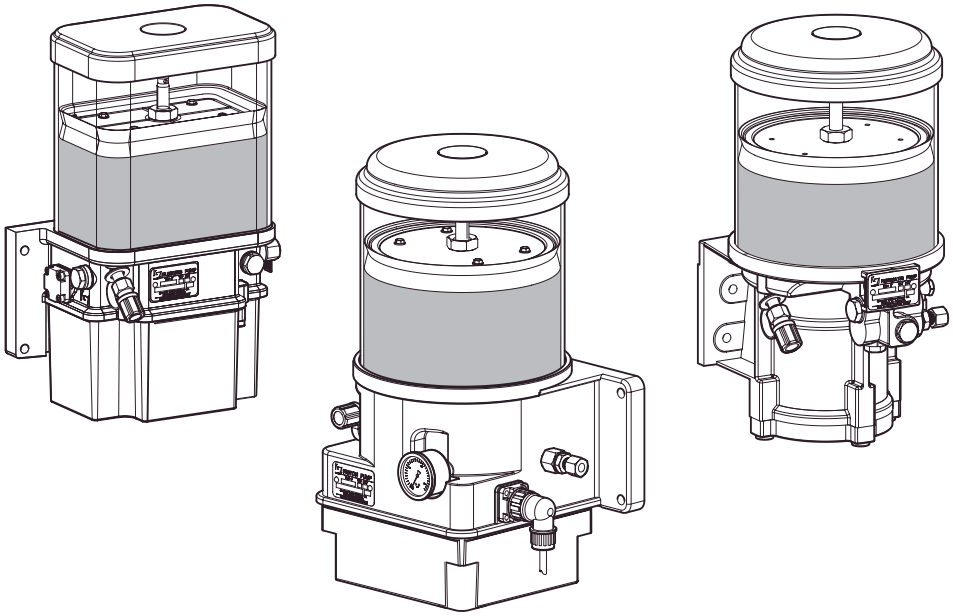
2.2 Temperature conversions

Celsius	*Fahrenheit*
-45	-49
-40	-40
-35	-31
-30	-22
-25	-13
-20	-4
-15	5
-10	14
-5	23
0	32
5	41
10	50
15	59
20	68
25	77
30	86
35	95
40	104
45	113
50	122

Notes

3.

PRINCIPLE OF OPERATION



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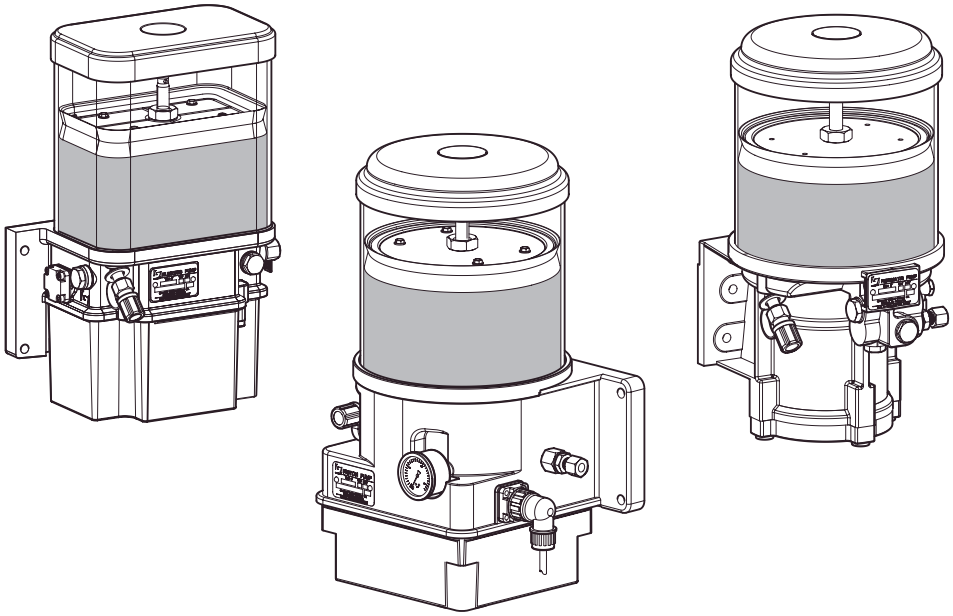
Each system consists of a pump with an integral reservoir, a control unit, a main pipe, one or more metering unit blocks, metering units, secondary piping and connectors. Lubricant is transferred from the reservoir by the pump, via the main pipe, to the metering unit blocks.
Each metering unit is connected by a secondary pipe to a lubrication point. An electronic timer, PLC or a pneumatically-operated impulse counter, depending on whether there is a continuous electrical supply available, is used to determine when lubrication occurs.
Generally only trailers and semi-trailers are equipped with a pneumatic (brake) impulse counter since they usually do not have a continuous electrical supply.
There are two main types of pumps:

- electrically-operated pumps (with electronic timer or PLC);
- pneumatically-operated pumps (with electronic timer, PLC or pneumatic impulse counter).

The electrically operated pump is used mainly for installations or vehicles without a compressed air supply. The electrically-operated pump is also used for installations where a large lubricant delivery is required. The delivery is larger as the pump operates for longer periods.

4.

SYSTEM SUMMARY



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4.1 System with pneumatically-operated pump and electronic timer/PLC

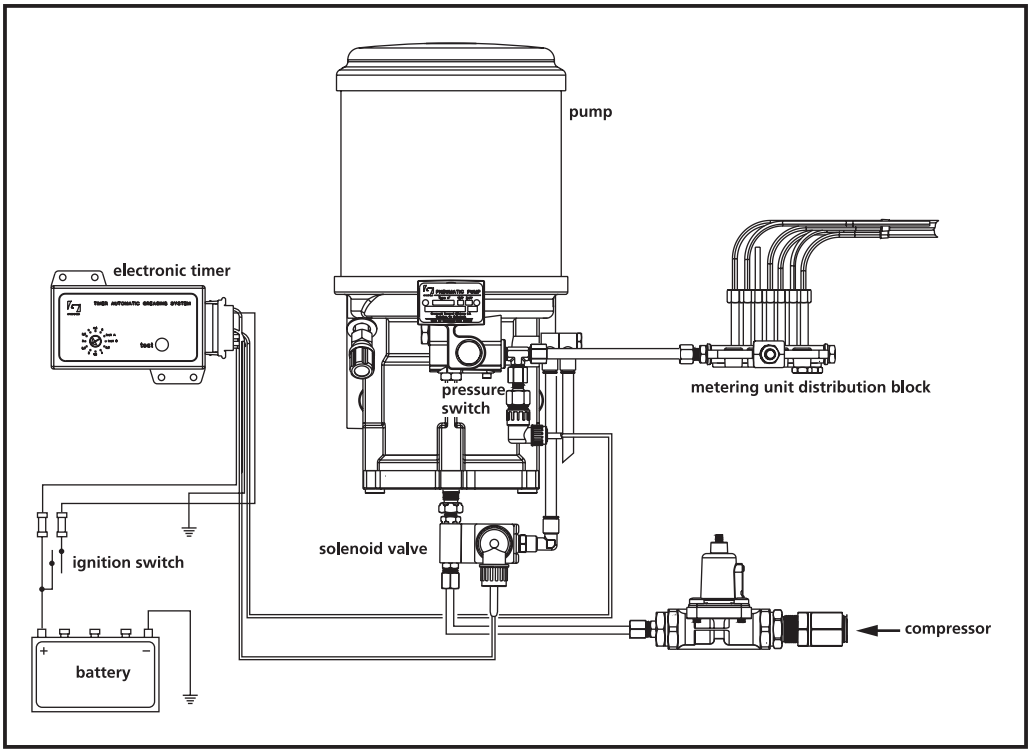


Figure 4.1 System with pneumatically-operated pump and electronic timer (schematically)

At a time preset by the electronic timer, the circuit to the solenoid valve is closed. The solenoid valve opens and allows compressed air from the compressor to flow to the pump.
The pump piston now rises under compressor pressure and forces grease into the system. The lubricant pressure is dependent upon the air pressure on the piston (this is the compressor pressure). With a compressor pressure of 125 psi and for a pump with 9:1 ratio, the grease pressure is 1125 psi.
The metering units then simultaneously pass a fixed, pre-selected metered quantity of grease to the points to be lubricated. To end the lubrication cycle the electronic timer or PLC opens the electrical circuit closing the solenoid valve. Therefore, the compressed air supply to the pump is shut off and the piston reverts to atmospheric pressure. This allows the piston to return to its starting position and the whole system is depressurized.
The metering units are then able to automatically refill themselves and are then (after a minimum delay of 2 minutes) ready for the next lubrication cycle.

4.2 System with pneumatically-operated pump and impulse counter

As a rule, trailers and semi-trailers are equipped with a pneumatic (brake) impulse counter and not with an electronic timer or PLC. This is because of a lack of a continuous electrical supply.
The standard version of the brake impulse counter is pneumatically-operated and uses the air signal from the service line which is usually connected to the number 4 position of the trailer relay valve. This position may differ in the different countries; please contact your local dealer or GROENEVELD. In certain situations the signal line can be too long, as is the case with extended semi-trailers. Another relay valve is then installed in the fixed part of the semi-trailer.
Alternatively, an electrical version of the pneumatic impulse counter can be used, which operates through the brake-light circuit.

4.2.1 System with pneumatically-operated impulse counter

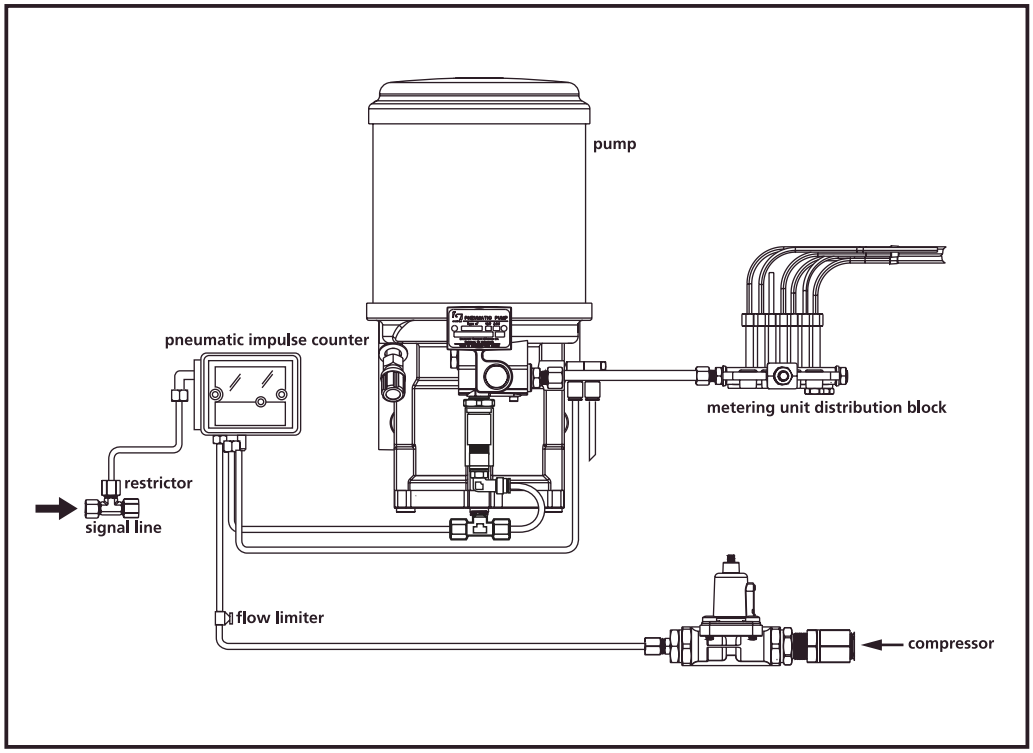


Figure 4.2 System with pneumatically-operated impulse counter (schematically)

The vehicle air tank is connected to input P of the pneumatic impulse counter. Always draw air from the auxiliary tank. Port A on the pneumatic impulse counter is connected to the compressed air connection on the underside of the pump. Port R on the pneumatic impulse counter is connected to the vent above the main piston. The other connection on this double banjo-union is an open vent.

4.2.2 System with electrically-operated impulse counter

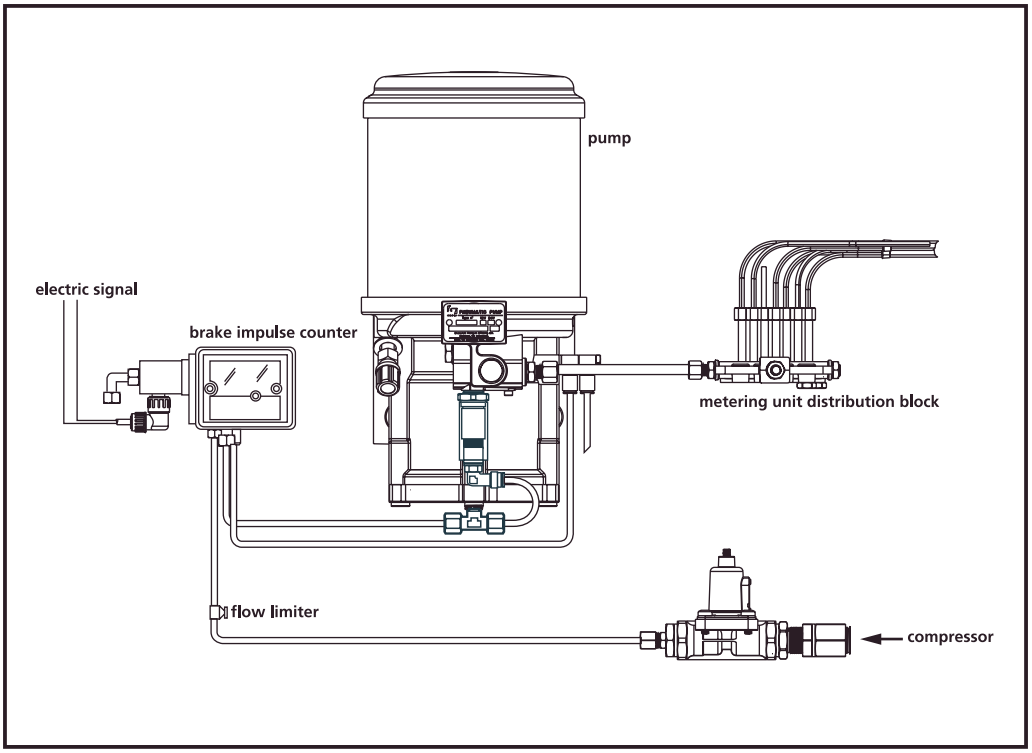


Figure 4.3 System with electrically-operated impulse counter (schematically)

This corresponds broadly with that of a pneumatically operated impulse counter. The signal impulse is derived from an electric signal.

4.3 System with electrically-operated pump

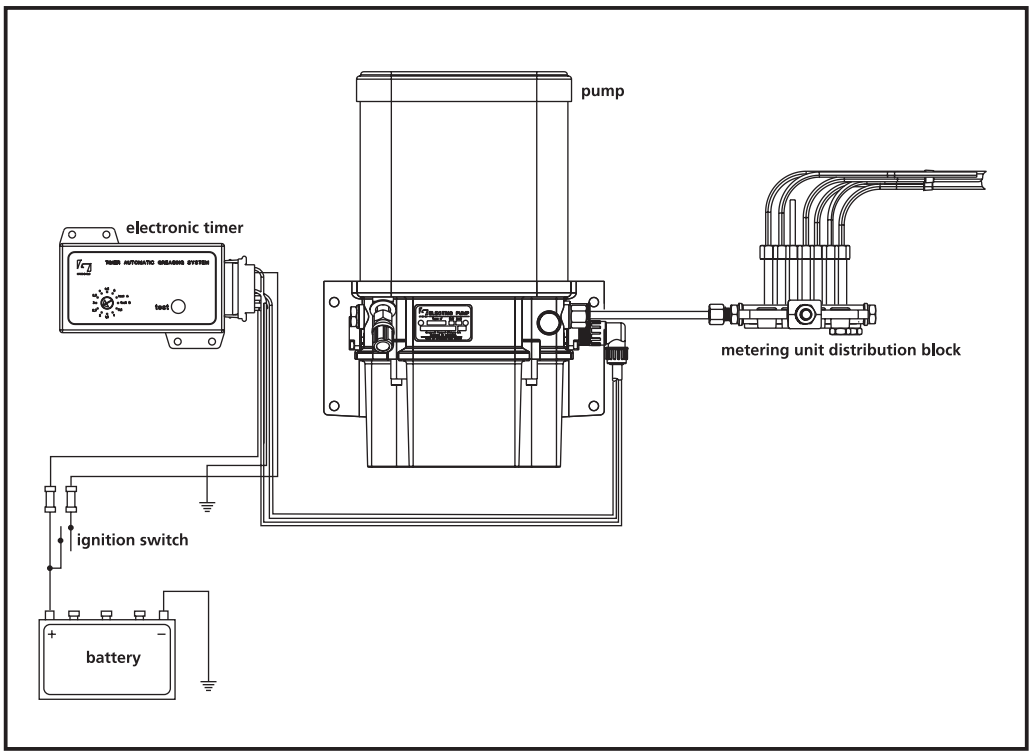


Figure 4.4 System with electrically-operated pump (schematically)

At a time set by the electronic timer or PLC, a gear pump under the grease reservoir is started. The lubricant is pumped from the reservoir via the main pipe, to the metering unit blocks. The metering units then simultaneously allow a measured quantity of lubricant to be pressurized to the points to be lubricated. A pressure bypass valve keeps the system at a preset pressure during the pumping cycle.
To end the lubrication cycle, the electronic timer or PLC opens the electrical circuit, the gear pump then stops. Pressure in the output main (primary) pipe to the metering units then falls by means of a built-in pressure discharge valve. The metering units then automatically refill themselves after which they are ready for the next lubrication cycle.

4.4 System with electric plunger pump

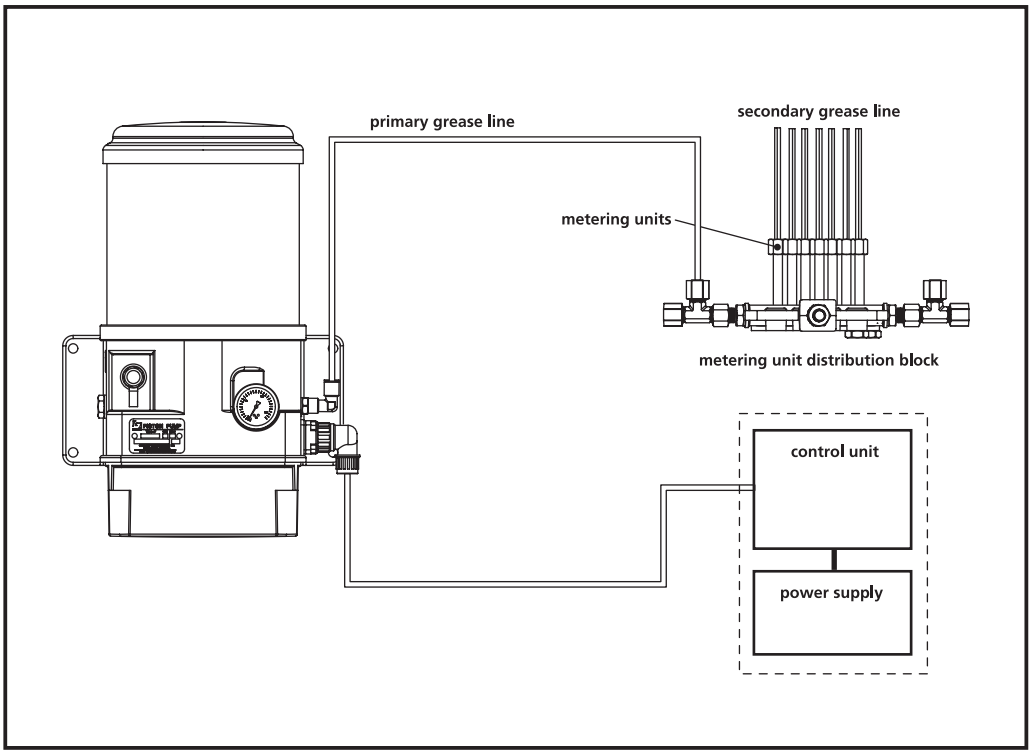
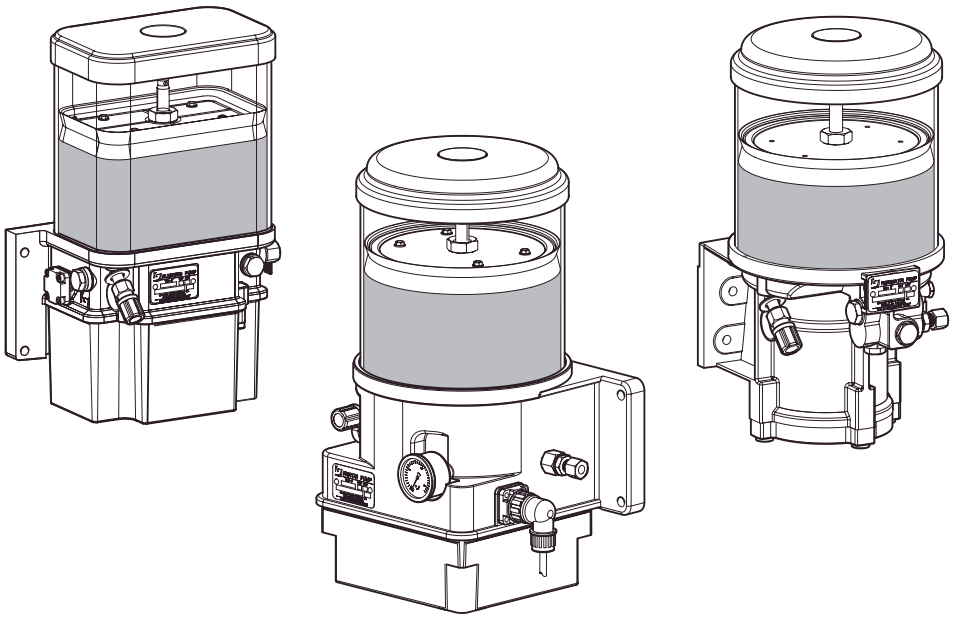


Figure 4.5 System with electric plunger pump (schematically)

GROENEVELD Automatic Greasing Systems with electrically-driven pumps are usually employed on vehicles or machines on which electric power is always available. An electric pump is also the best choice if the lubricant demand of the system is high.
The control unit - an advanced electronic timer, for instance - holds a number of system control variables, such as the lubrication interval and the duration of the lubrication cycle. The control unit is able to process and store all functional errors that may occur and automatically maintains an electronic log book. If the greasing system requires action, the controller will generate an alarm signal (i.e. if the reservoir needs to be refilled).
At a given point in time, the control unit will start the pump and lubricant will be pressed through the primary line to the distributors and, consequently, to the dosage metering units. Each metering device then forces - powered by the grease pressure - an exact amount of grease through the secondary lines to the grease points. All metering units act simultaneously. The amount of lubricant that goes to each of the grease points depends on the type of metering device installed.
A pressure control valve - built into the pump unit - maintains a constant pressure of 1500 psi in the system during the lubrication cycle (i.e. while the pump runs).
If the grease pressure exceeds 1500 psi this valve will redirect the grease back toward the reservoir.
During the lubrication cycle, the integrated pressure switch must report to the control unit that the required pressure has been attained (at least 1029 psi). If the control unit does not receive this signal it will generate an alarm signal.
The lubrication cycle ends when the control unit stops the pump. The pressure in the primary line then slowly drops to zero, via an electrically-controlled relieve valve. The metering units will then be able to reset themselves and will be ready for the next lubrication cycle after about two minutes.

5.

PUMPS



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5.1 Pneumatically-operated piston pump

5.1.1 Pump unit

1. reservoir with follower plate
2. air venting channel
3. grease channel
4. return channel to reservoir
5. main line connection
6. pressure channel
7. return valve
8. non-return valve
9. grease pressure colour indicator
10. compressed air connection
11. main air piston
12. spring
13. filler connector
14. small grease piston
15. grease chamber
16. flapper valve
17. connection to reservoir

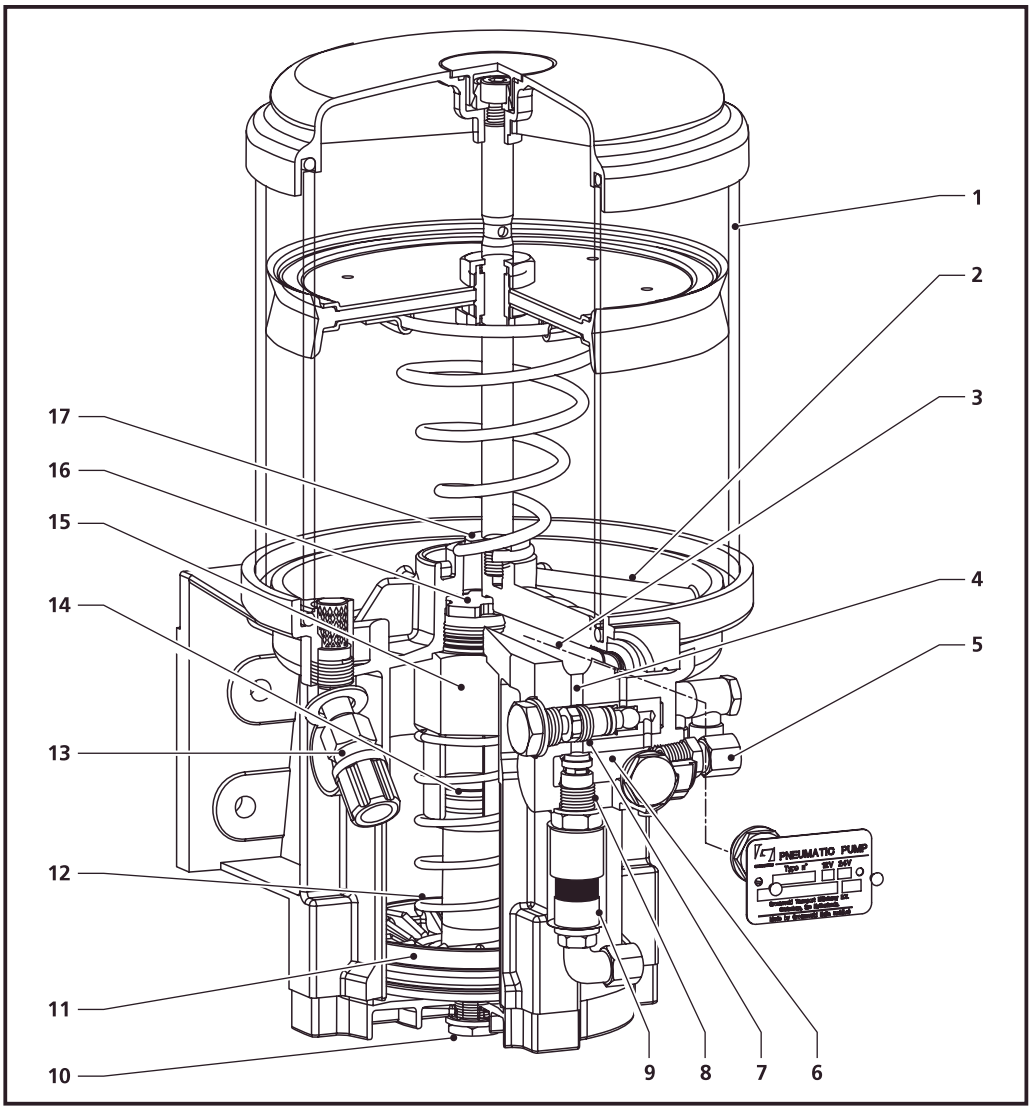


Figure 5.1 Pneumatically-operated pump

If pressure is applied via the compressed air connection (10) the main piston (11) will be forced upwards applying pressure to the lubricant in chamber (15). The pressure in chamber (15) forces valve (16) against the seat. The connection (17) to the reservoir (1) is thus closed.
The lubricant leaves the chamber (15) via a channel (3) through the non-return valve (8) into the main or primary line. The metering units are brought under full pump pressure passing their metered quantities of lubricant into the lubrication points. As a result of the pressure differential at the return valve (7) the return channel (4) remains closed.
At the end of the complete lubrication cycle the air pressure under the main piston (11) falls, allowing the piston to be pushed downward by the spring (12). At the same time flapper valve (16) is released and, because of the reduced pressure in the chamber (15), lubricant is drawn from the reservoir.
The non-return valve (8) prevents grease from the system piping and metering units from flowing back into the chamber (15).
The pressure in the main pipe opens the return valve (7) via the channel (6). This allows the pressure of the lubricant to flow via the channel (4) to the reservoir. The metering units, with this pressure drop can now automatically refill themselves following which, they are ready for the next lubrication cycle.
A manometer can be connected to the lubricant channel showing the pressure in the main line. It is also possible to replace this manometer by a pressure colour indicator (9). At the start of the lubrication cycle, this will be red as a result of the air pressure, and will change to green at the end of the cycle, due to the pressure.
Green, thus, indicates that the pump has worked and that sufficient pressure has built up in the grease line system. If the color remains red, this means that insufficient pressure has built up in the system. This could be caused by leakage from the main line.

5.1.2 Technical data

Grease pumps:

	part number		
	36201	***68801***	***35501***
reservoir capacity	4 liters	6 liters	8 liters
delivery	42 cc / stroke		
ratio	9:1		
grease pressure	1125 psi (for an air pressure of 125 psi)		
maximum grease pressure	1500 psi		
temperature range	-13°F to +176°F (NLGI 0 grease)		
weight	13.86 lbs	14.85 lbs	15.84 lbs

	part number		
	37101		***43001***
reservoir capacity	4 liters	6 liters	8 liters
delivery	60 cc / stroke		
ratio	9:1		
grease pressure	1125 psi (for an air pressure of 125 psi)		
maximum grease pressure	1500 psi		
temperature range	-13°F to +176°F (NLGI 0 grease)		
weight	16.54 lbs	17.53 lbs	18.52 lbs

Oil pumps:

	part number	
	00511	***06511***
reservoir capacity	4 liters	8 liters
delivery	42 cc / stroke	
ratio	9:1	
oil pressure	1125 psi (for an air pressure of 125 psi)	
maximum grease pressure	1500 psi	
temperature range	-13°F to +176°F	
weight	13.32 lbs	14.3 lbs

5.2 Electrically-operated gear pump

5.2.1 Pump unit

1. follower plate
2. low level indicator switch
3. pressure control valve
4. connector fitting
5. vent opening
6. main pipe line connector
7. pressure switch connection
8. electro-motor
9. filler connector
10. gear pump
11. reservoir

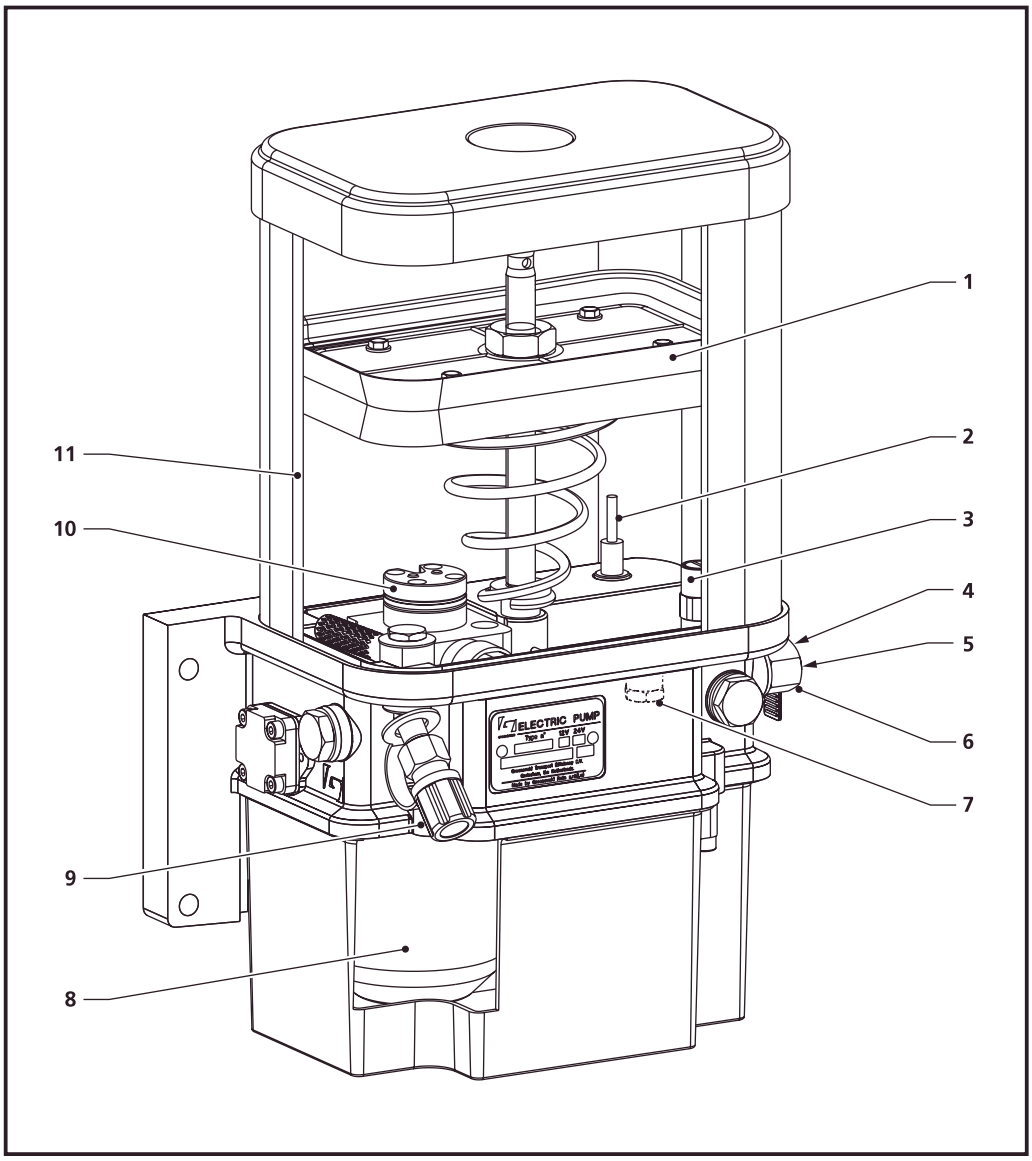


Figure 5.2 Electrically-operated pump

The gear pump (9) is activated by the electronic timer. The lubricant will now be pumped from the reservoir (10) through the main pipe line (6) to the metering unit distribution blocks. The pump remains in operation throughout the entire cycle period. This cycle or impulse period is 3 minutes, when the standard version of the electronic timer is used. The pump builds up the lubricant pressure during the cycle. When the pressure reaches 838 psi, the pressure control valve (3) opens, lubricant is then no longer pumped into the main line but returns to the reservoir. The pressure is thus limited to 838 psi.
The standard version of the electrically-operated pump is fitted with a pressure switch (7). If, during the lubrication cycle, the pressure does not rise above 588 psi the electronic timer or PLC will sound an alarm signal. A level indicator switch (2) (not in all versions) provides an alarm signal if the lubricant in the reservoir falls below a certain minimum level.
On the right-hand side between the connector for the primary line (6) and the connector fitting (4),there is a right-angle connector for air venting and overflow (5). When filling the reservoir with lubricant the air above the follower plate escapes. This air flows downward through an opening in the piston line and leaves the pump via the right-angle connector (5). The escape of a small quantity of lubricant via this connector during venting is quite normal.
(A version with the connections for the primary line and for the connector on the left-hand side of the pump can also be supplied if required.)

5.2.2 Technical data

Gear pump:

	part number	
without level indicator switch:	***530.01 (12 V)***	***522.01 (24 V)***
with level indicator switch:	***531.01 (12 V)***	***523.01 (24 V)***
current consumption	8 A	4 A
reservoir capacity	2.7 litres	2.7 litres
delivery	120 cc/minute (NLGI 0 grease) at 20 °C	120 cc/minute (NLGI 0 grease) at 20 °C
grease pressure	855 psi	855 psi
temperature range	-4°F to +158°F (NLGI 0 grease)	-4°F to +158°F (NLGI 0 grease)
	at extreme circumstances, please consult your local GROENEVELD organization	
weight	14.74 lbs	14.74 lbs

5.3 Electric axial plunger pump

5.3.1 Pump unit

1. follower piston
2. reservoir
3. guide rod of follower
4. level switch
5. plunger pump
6. coupling for primary grease line
7. electric connector
8. pressure switch
9. electric motor
10. return valve
11. filler port
12. overflow port
13. filter
14. pressure control valve

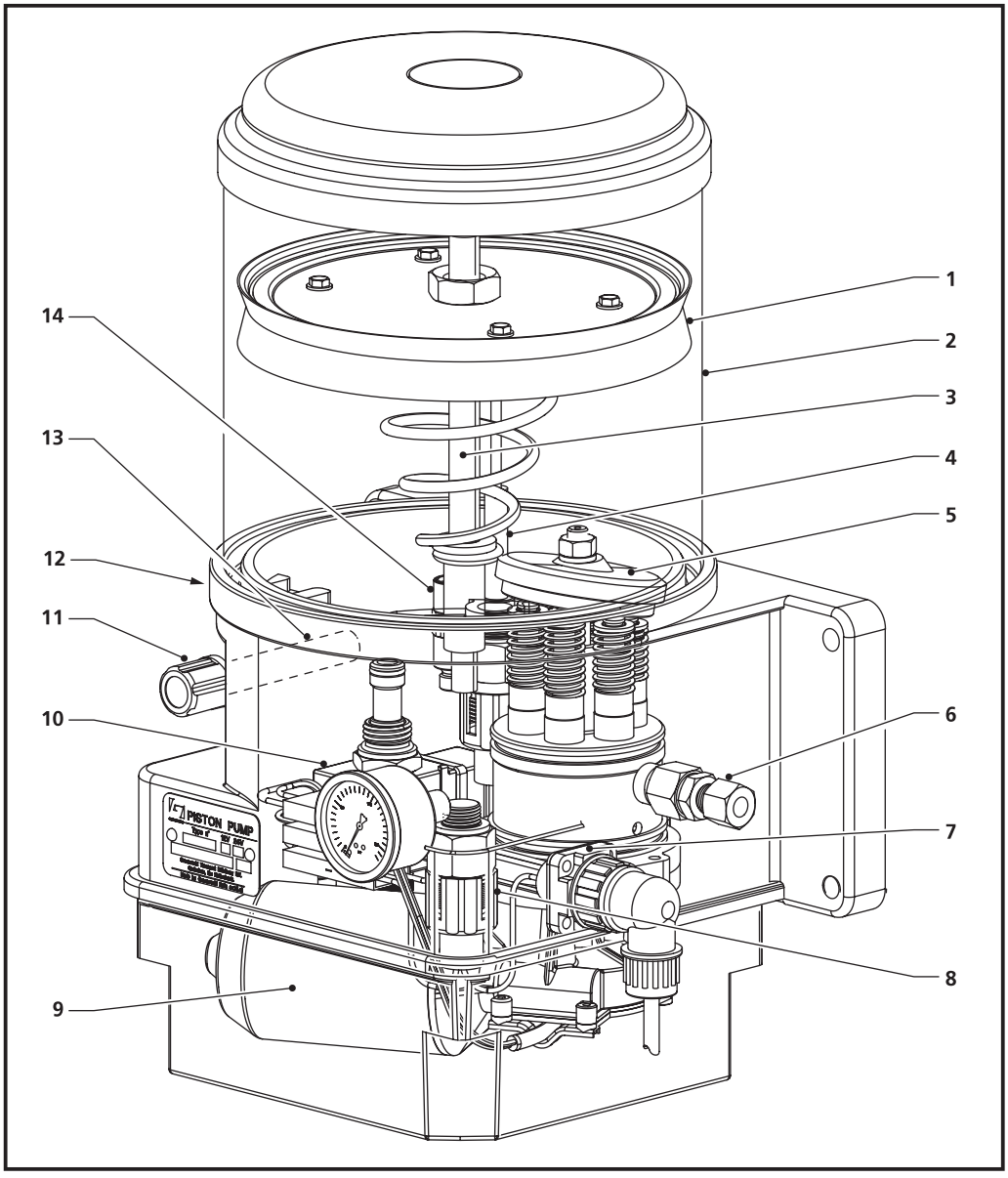


Figure 5.3 The electric plunger pump

The actual pump (5) of the unit consists of six fixed cylinders amid a ring duct. The six plungers are driven by the electric motor (9) through a mechanical transmission. In the channel between the ring duct and the output port (6) of the pump unit, a pressure control valve (14) and an electrically operated return valve (10) have been incorporated. The pressure control valve is used to maintain a constant grease pressure during the pump cycle. The return valve allows the grease pressure in the system to fade after the pump cycle has ended.
The standard electric plunger pump is fitted with a pressure switch (8) which is used to check that the required grease pressure is attained during the pump cycle. The optional low level switch (4) in the reservoir will cause the control unit to generate an alarm signal when the level of the lubricant in the reservoir becomes too low and needs to be replenished.
The pump is electrically-connected with the control unit through a connector (7).
The reservoir (2) is mounted on top of the pump unit. The reservoir is filled via the filler port (11) at the side of the pump unit. A filter (13) prevents contaminations from entering the reservoir. Any bubbles of air that might be introduced in the lubricant while filling the reservoir can escape to the space above the follower piston (1) through the overflow port (12) and a channel in the guide rod (3). If the reservoir is - inadvertently - filled to a level above its maximum level, this excess lubricant is also allowed to escape in this way.

5.3.2 Technical data

Grease pump:

	partnumber					
	160.22	***161.22***	***162.22***	***214.22***	***315.22***	***339.22***
grease output (cc/min) *(see remark)*	50	25	25	50	25	25
max. grease pressure (psi)	1500 psi	1500 psi	1500 psi	1500 psi	1500 psi	1500 psi
content reservoir (litres)	8	8	4	4	4	4
supply voltage (V dc)	12	24	24	12	12	24
nominal current (A)	8	4	4	8	8	4
electrical connection (connector): pin 1: plus pin 2: minus pin 3: grease pressure switch pin 4: grease level switch	4-pin					
follower piston in reservoir	yes	yes	yes	yes	yes	yes
integrated pressure switch	yes	yes	yes	yes	yes	yes
level switch	optional	optional	optional	optional	optional	optional
operating temperatures (°F): 0-grease 00, 000, or of LT-grease	+23°F . . . . +176°F (operating temperatures below +5°F)					
weight	21.56 lbs	21.56 lbs	19.36 lbs	19.36 lbs	19.36 lbs	19.36 lbs

REMARK:

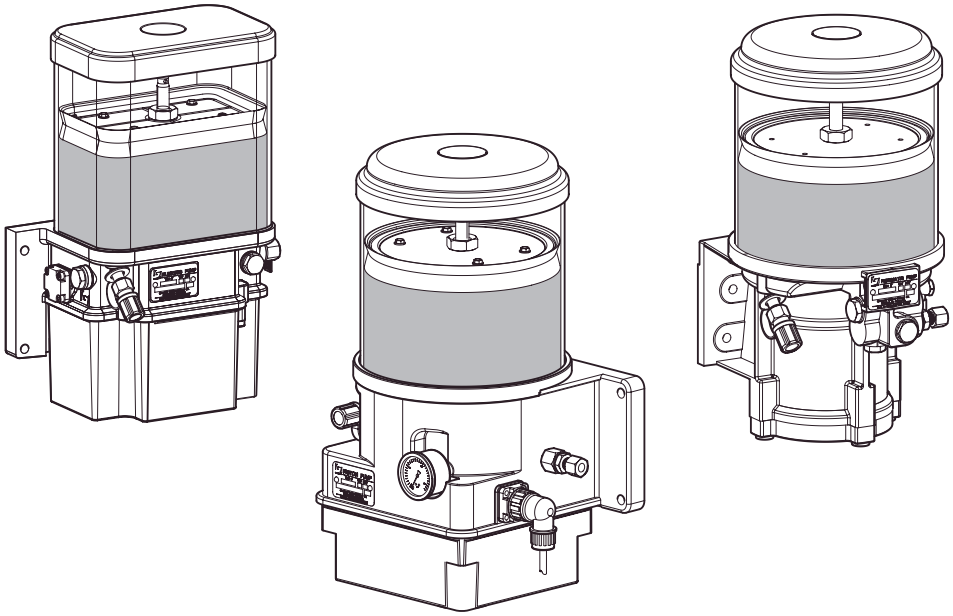
The output of the pump is specified in cubic centimetres per minute. If the greasing system is to operate properly however, the pump should have supplied the total quantity of grease required by the system before 70% of the lubrication cycle has expired. The length of the cycle must be set accordingly. This will guarantee that the grease pressure reaches a value of at least 1176 psi and that the pressure switch in the pump will report this fact to the control unit. If the control unit does not receive this signal, it will generate an alarm signal.

Oil pumps:

	part number	
	61522 (24Vdc)	***F172672 (24Vdc)***
current consumption	4 A	4 A
reservoir capacity	4 liters	8 liters
delivery	50 cc/minute at +68°F	50 cc/minute at +68°F
oil pressure	855 psi	855 psi
temperature range	-4°F to +158°F	-4°F to +158°F
	at extreme circumstances please consult your local GROENEVELD organization	
weight	20.24 lbs	22.44 lbs

6.

ELECTRONIC TIMER



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6.1 Electronic timer

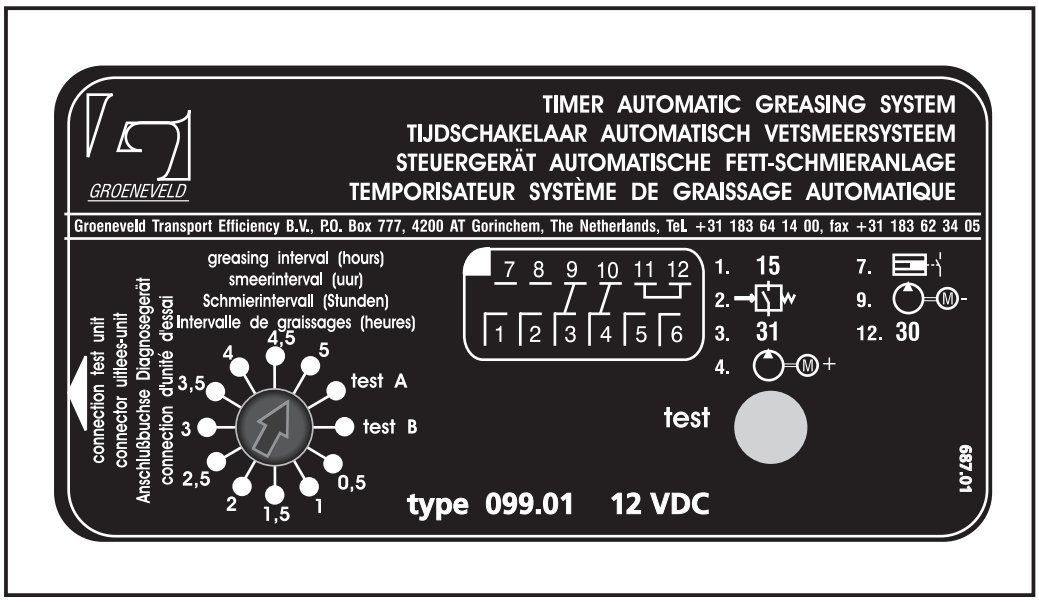


Figure 6.1 Electronic timer

The greasing system (with a pneumatically-operated or electrically-operated pump) can be controlled by an electronic timer (Figure 6.1). The timer produces, at set time intervals impulses lasting 3 minutes. These impulses energize the solenoid valve in the air supply to start the lubrication cycle. With an electrically operated pump the impulses start the pump. The interval between successive lubrication cycles is adjusted on the electronic timer.
If during a cycle the power supply is switched off, a complete new lubrication cycle will restart when the power supply is again switched on.
The electronic timer has a memory in which data is stored even after switching off the power supply.
The data stored is as follows:

- interval duration
- impulse duration
- conditions for an alarm signal
- total number of cycles since first fitted
- total number of alarm signals since first fitted
- longest series of successive alarm signals in a certain period
- remaining interval time

The data in the memory can be recovered using a special test or read-out unit. This device should be connected via the socket on the left-hand side of the timer.

6.2 Adjustment of the cycle time interval

The interval time between two successive lubrication cycles can be adjusted using the step switch. One of ten time intervals can be selected. The standard version has time intervals increasing by 0.5 h steps (0.5 h, 1 h, 1.5 h etc. to 5 h). If the power supply is switched off during a cycle the cycle will be ended. When the power supply is switched on again a complete new cycle will be started.

6.3 Testing the electronic timer

The various electronic timer functions can be tested as follows:

Test 1, step switch test:

- This test checks the step switch contacts in all positions.
- Set the step switch to position 'test A'.
- Activate the electronic timer by switching on the ignition.
- Press the 'test' button.
- Wait for the audible alarm signal then release the 'test' button.
- Within 5 seconds turn the step switch to the required interval time position. Each position produces a number of signals: position 1 gives one signal, position 2 two signals etc.
- The switch can be set to all positions; positions 'test A' and 'test B' will not produce an alarm signal.
- End the test by switching off the ignition.

Test 2, accelerated cycle test:

- Set the step switch to position 'test A'.
- Press and hold the 'test' button.
- Switch the ignition on while still keeping the 'test' button pressed in.
- The alarm signal buzzer will now sound. The 'test' button must be pressed as long as the alarm signal continues.
- Within 5 seconds of the end of the alarm signal turn the step switch to the required position.
- The electronic timer is now fully operational; the time intervals are now 1/20 of their usual times.
- End the test by switching off the power supply.

Test 3, normal system test:

- Switch the ignition on.
- Press the 'test' button; a normal lubrication cycle will then follow. The switch can be set in any position except 'test A' or 'test B'.

After this test the electronic timer will work at the interval set.
The 'test B' position is only for use with the test or read-out unit.

6.4 Alarm signals

Alarm signals can be generated by the electronic timer in various circumstances. The standard version uses a built-in buzzer. In other versions another (external) alarm indicator can be fitted, for example a lamp.
The alarm signal is generated in the following situations:

- After reaching 70% of the cycle time (70% of 3 minutes = 2 minutes) the pressure switch should have connected to earth. If this is not the case - because insufficient pressure has been built up - then a continuous alarm signal is generated.
- If a level indicator switch is fitted to an electrically-operated pump, an intermittent alarm is generated when the level of the lubricant in the reservoir falls below a set minimum. This signal will be generated throughout the entire cycle. If, moreover, insufficient pressure is built up, the pressure alarm will take over after 2 minutes, causing a change in the frequency of the alarm signal.
- The electronic timer runs a self-test after the power supply is switched on; if there is a fault condition an intermittent alarm is generated. This can occur if no interval is selected by the step switch.

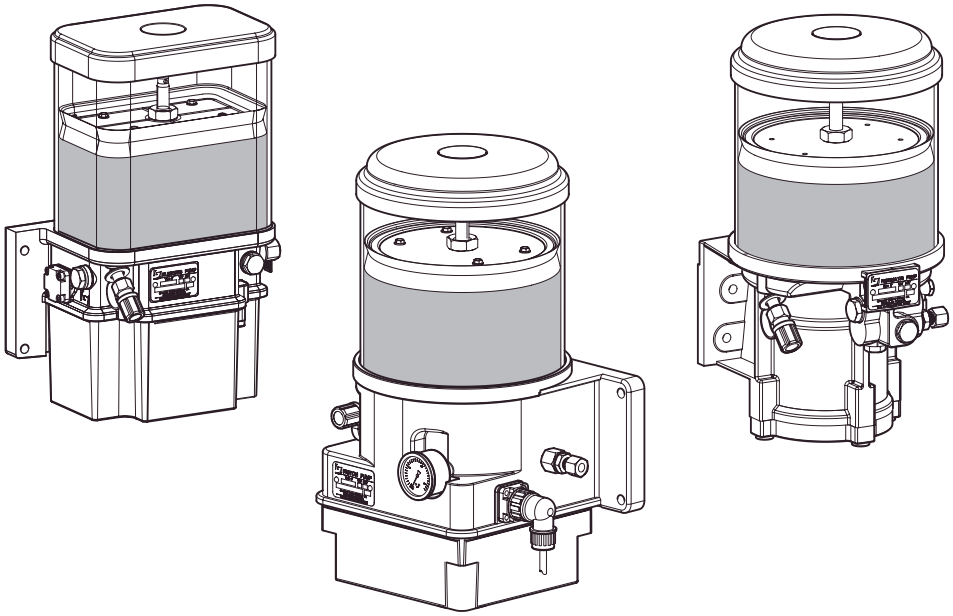
If the electronic timer sounds an alarm to indicate that the timer or greasing system is not functioning properly, it is strongly advised to examine (or have examined) the greasing system and,if necessary,to make repairs. If this is left too long, damage can be caused to either the installation or the greasing system.

6.5 Technical data

	part number					
	099.01 (12 V)	***032.01 (24 V)***	***676.02 (12V)***	***675.02 (24V)***	***678.02 (12V)***	***677.02 (24V)***
cycle time	3 minutes		2 minutes		3 minutes	
cycle intervals	steps of 30 minutes (0.5 - 5 h)		steps of 5 minutes		steps of 30 minutes	
alarm	built-in buzzer		internal relay (16A)		internal relay(16A)	

7.

PNEUMATIC IMPULSE COUNTER



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7.1 Operation

1 solenoid valve
2 screw for manual operation (test)
P compressed air connection
A pump connection
R venting outlet

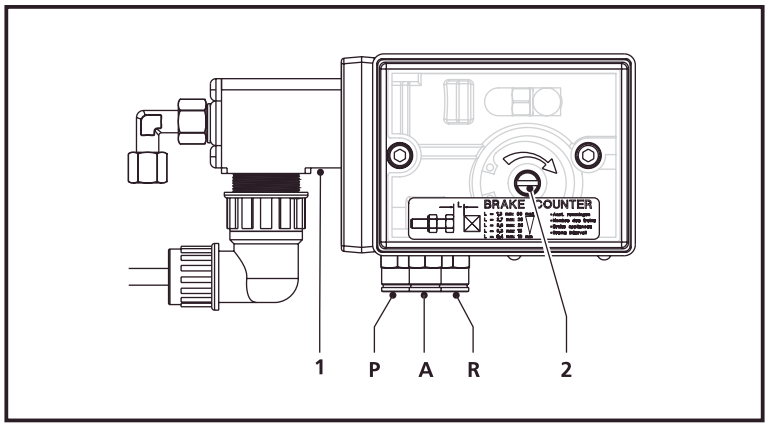


Figure 7.1 Electrically-operated brake impulse counter

1 signal air
2 screw for manual operation (test)
P compressed air connection
A pump connection
R venting outlet

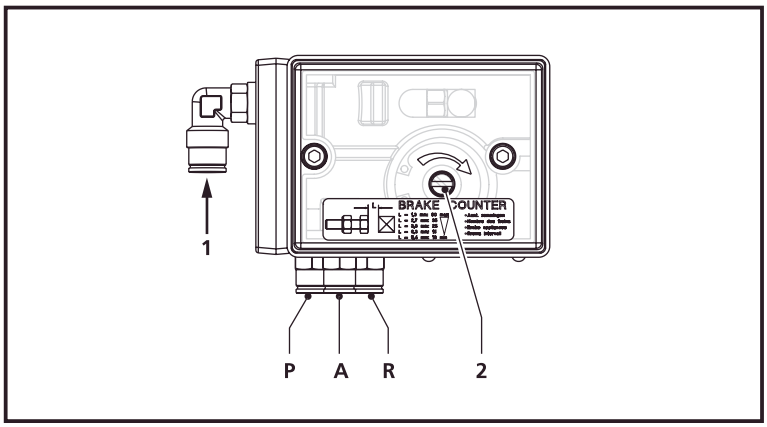


Figure 7.2 Pneumatically-operated brake impulse counter

The pneumatic impulse counter starts the lubrication cycle after a set number of pulses. The electrically-operated counter (Figure 7.1) is activated by an electric signal. The solenoid valve of the pneumatic impulse counter is energized, causing the operating cam to be rotated. With a pneumatically-operated impulse counter (Figure 7.2) activation is through pulses from the pneumatic system before the relay valve. The compressed air operates a piston, which in turn rotates the operating cam.
After a preset number of pulses the operating cam opens the air valve through which compressed air passes to the pump.
The lubrication cycle then begins. After a further number of pulses, depending on the setting of the counter, the pump is vented through the venting outlet R.

Date of issue: January 2004

7.2 Setting the number of brake applications

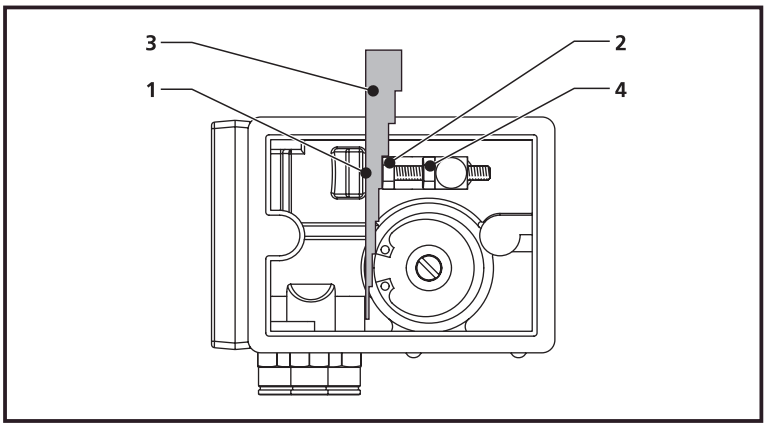


Figure 7.3 Setting the brake impulse

The number of pulses required for the counter to activate the pump, is set as follows:

- Remove the transparent cover.
- Set the distance (Figure 7.3) between the left-hand side of the striker (1) and the head of the adjusting bolt (2). The distances equivalent to a specific number of pulses are shown on the transparent cover. A feeler-gauge (3) is fixed to the inside of the cover and can be used to set this distance. The tool is marked with the number of pulses related to each thickness.
- Tighten the adjustment bolt lock nut (4).
- Replace and secure the cover.

REMARK:

Setting the pneumatic impulse counter is easier when the pneumatic line is under pressure. This moves the cam striker to the right so that the distance between the striker and the adjustment bolt can be measured.

7.3 Technical data

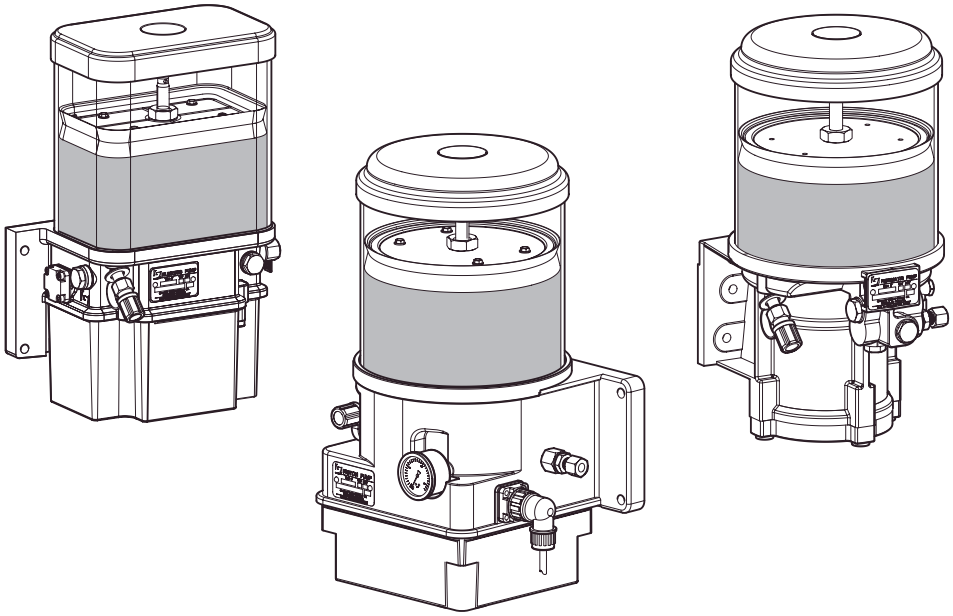
	part number	
	074.01 pneumatically operated	***003.01 electrically operated***
cycle time	minimum 2 brake impulses	minimum 2 brake impulses
cycle intervals	10 - 80 brake impulses	10 - 80 brake impulses

Date of issue: January 2004

Notes

8.

METERING UNITS



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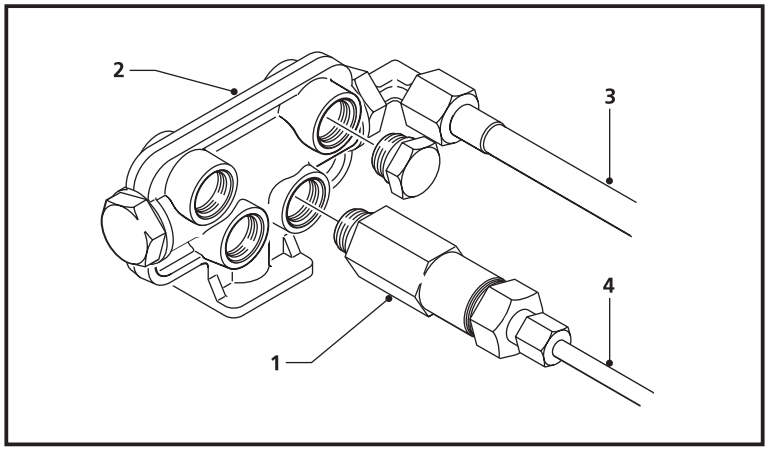


Figure 8.1 Distribution block with metering units

There are 11 metering unit types (1) available for the Single Line system, each with a differing metered lubricant quantity. By careful selection of the type of metering unit each lubrication point can be provided with the right quantity of lubricant.
The metering units are fitted in groups on distribution blocks (2); this is a cast brass distribution block to which the primary (main) line(3) is connected. The blocks are available with several ports or outlets to which metering units can be connected. The unused outlets should be blanked-off.
The metering units are also made of brass and are, because of their enclosed design, exceptionally suitable for use in dirty and dusty conditions. It is not advisable to open the metering units as this allows the entry of dirt, and, thus, is a potential cause of faults.

8.1 Types of metering units

The delivery (per lubrication cycle) of a metering unit is determined by the number and thickness of the spacers mounted between the head and the housing of the metering unit (Figure 8.2). The following metering units are available:

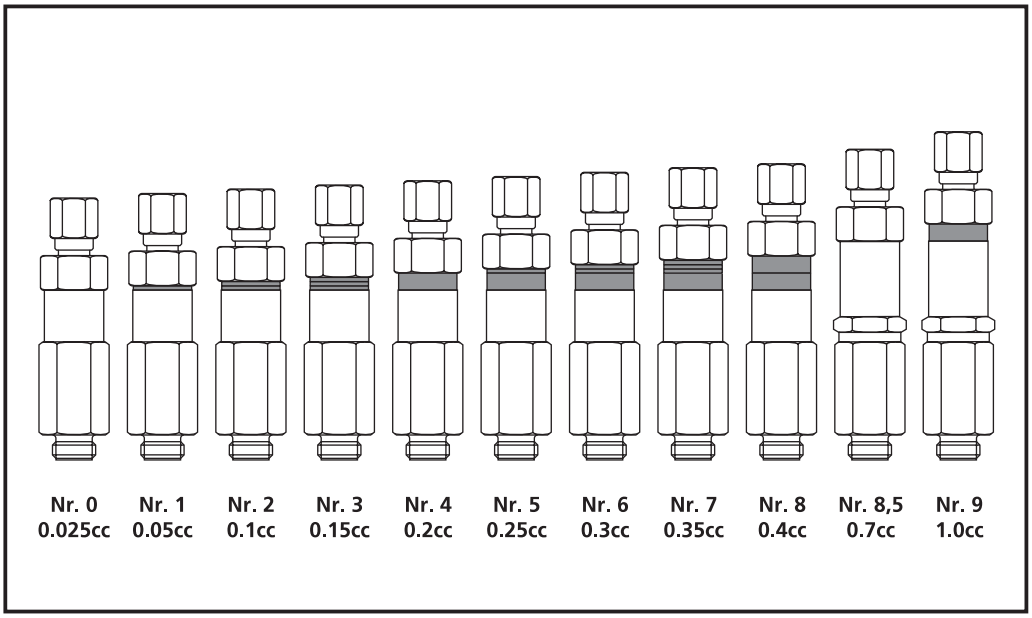


Figure 8.2 Types of metering units

8.2 Operating principle

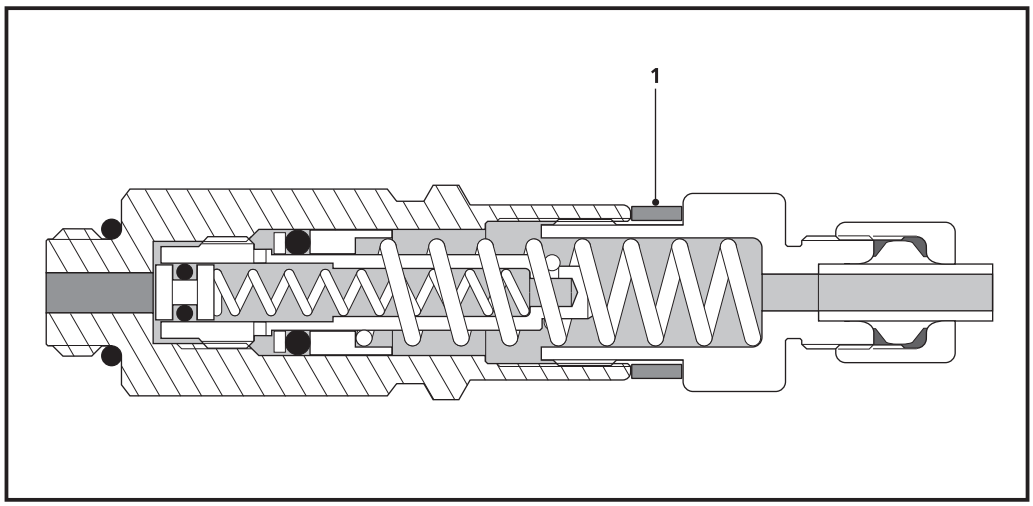


Figure 8.3 Metering unit in initial position

Figure 8.3 illustrates a new metering unit, one that has not yet been filled with grease. Item (1) in this figure is the spacer, which determines the delivery of the metering unit (see previous paragraph).
The metering units that are used in your greasing system may differ externally, or even internally, from the one illustrated here. However, the operating principle is always the same.

8.3 Phase A

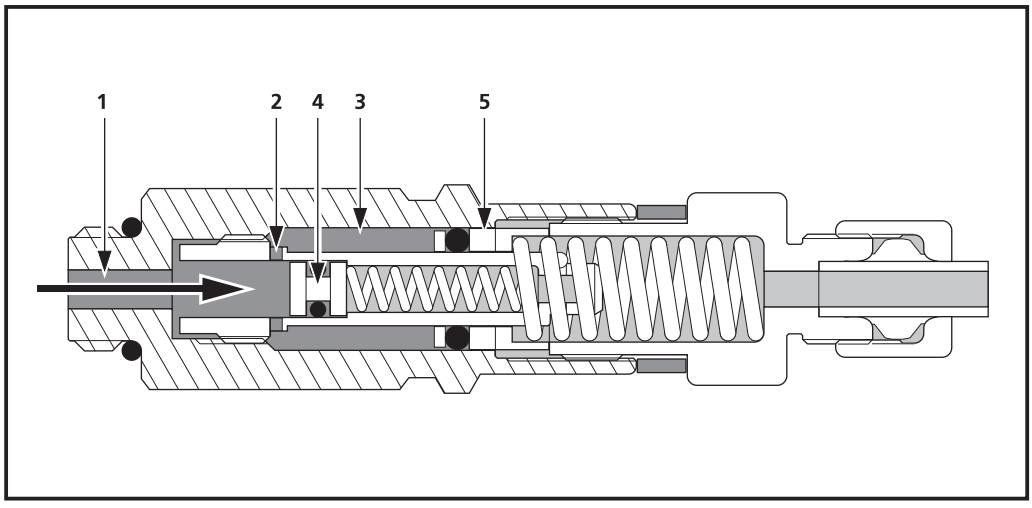


Figure 8.4 Metering unit in phase A

The pump presses the grease into grease channel (1). The grease pushes plunger (4) past channel (2). The grease now fills chamber (3) and pushes plunger (5) to the right. The stroke length of plunger (5) will determine the amount of grease that will be pressed through the secondary grease line to the grease point. This stroke length - hence the capacity of chamber (3) – is determined by the number and thickness of the spacers (Figure 8.3/1).

8.4 Phase B

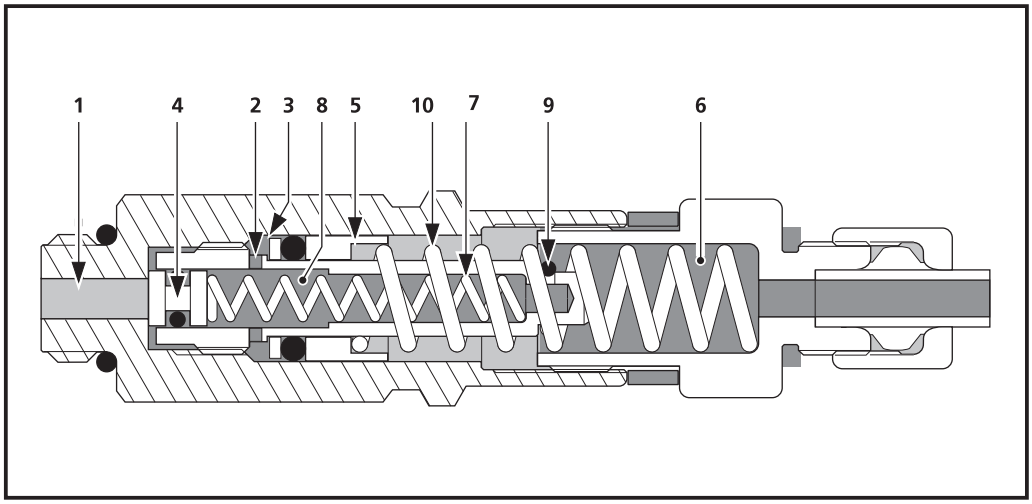


Figure 8.5 Metering unit in phase B

When the pump stops and as the grease pressure drops, spring (7) (Figure 8.5) will push plunger (4) back to the left, closing off channel (1).
O-ring (9) prevents grease from being sucked back from chamber (6). Plunger (5) is pushed back by spring (10) and presses the grease in chamber (3), via channel (2), to chamber (8).

8.5 Phase C

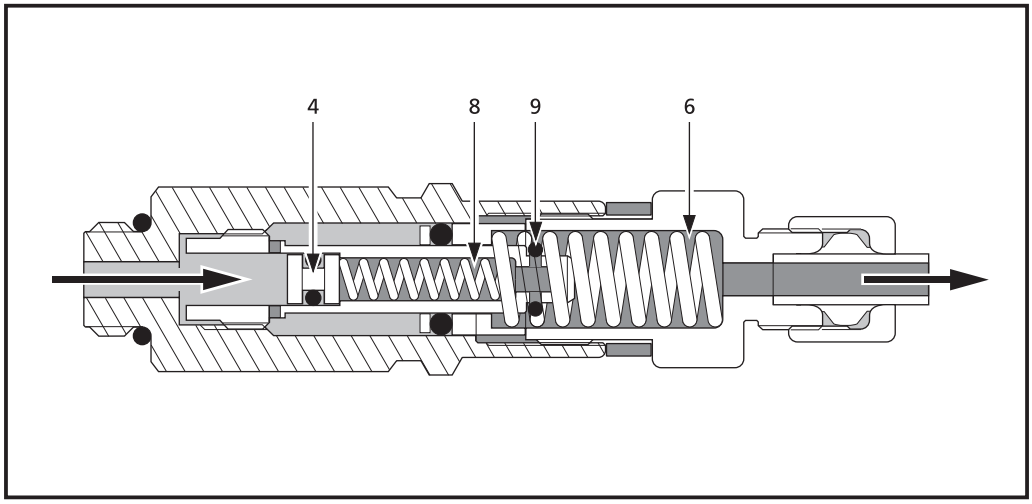
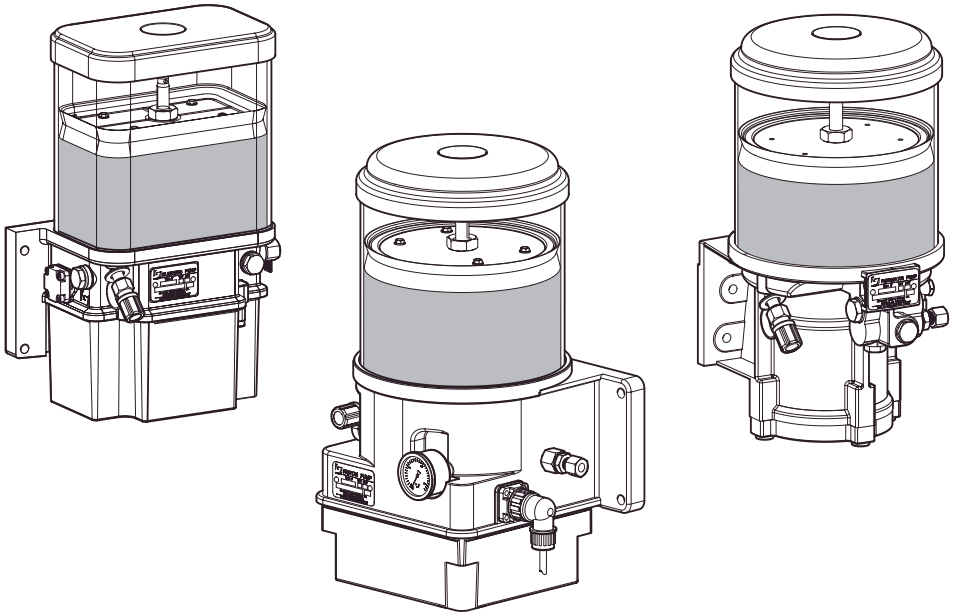


Figure 8.6 Metering unit in phase C

During the next lubrication cycle, the same happens as in phase A. Chamber (8) (Figure 8.6), however, is now filled with grease. As plunger (4) moves right under influence of the grease pressure, the grease in chamber (8) is pressed, via chamber (6) and the secondary grease line, to the grease point.
During all this, O-ring (9) is pressed outward to allow the grease to leave chamber (8).

9.

OTHER COMPONENTS



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9.1 Solenoid valve

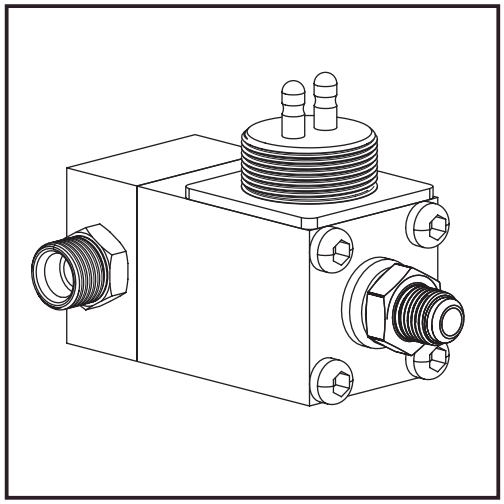


Figure 9.1 Solenoid valve

The solenoid valve (Figure 9.1) between the air tank and the pneumatically-operated pump (usually fitted to the pump) is a normally closed, free venting type. The valve is connected electrically by an M24 screw connector.

9.1.1 Technical data

	part number	
	184.08 (12 V)	***183.08 (24 V)***
type	normally-closed with open venting	normally-closed with open venting
operating pressure	maximum 150 psi	maximum 150 psi
power requirement	maximum 8 W	maximum 8 W
screw thread	M24	M24

9.2 Pressure switch

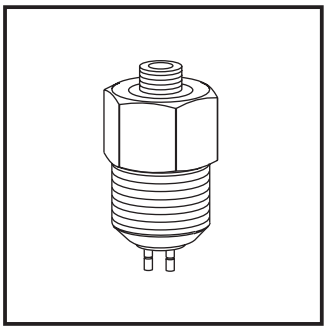


Figure 9.2 Pressure switch

A pressure switch is included in the lubrication system (in the main pipe) to provide an alarm for too low a pressure in the system during the lubrication cycle.
This switch closes at a pressure of 600 psi, making a connection to earth. If this does not happen during the lubrication cycle, because insufficient or no grease pressure is generated, an alarm will be given. During the remaining cycle time there will be an intermittent alarm signal. This alarm will be repeated after a preset time if the problem is not corrected.
An M24 screw connector connects the switch electrically.
For a system with a pneumatically-operated pump the pressure switch is fitted to a distribution block. The electrically-operated pump is provided with a built-in pressure switch.

9.2.1 Technical data

	part number
	225.01
type	normally-open
switching pressure	600 psi
connection	2-wire
screw thread	M24

9.3 Reservoir

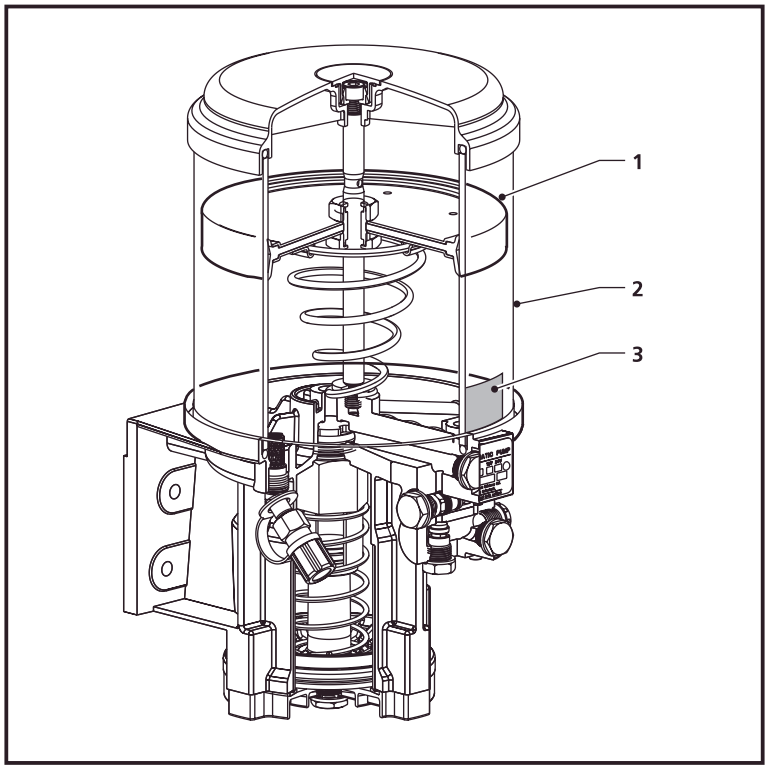


Figure 9.3 Pump

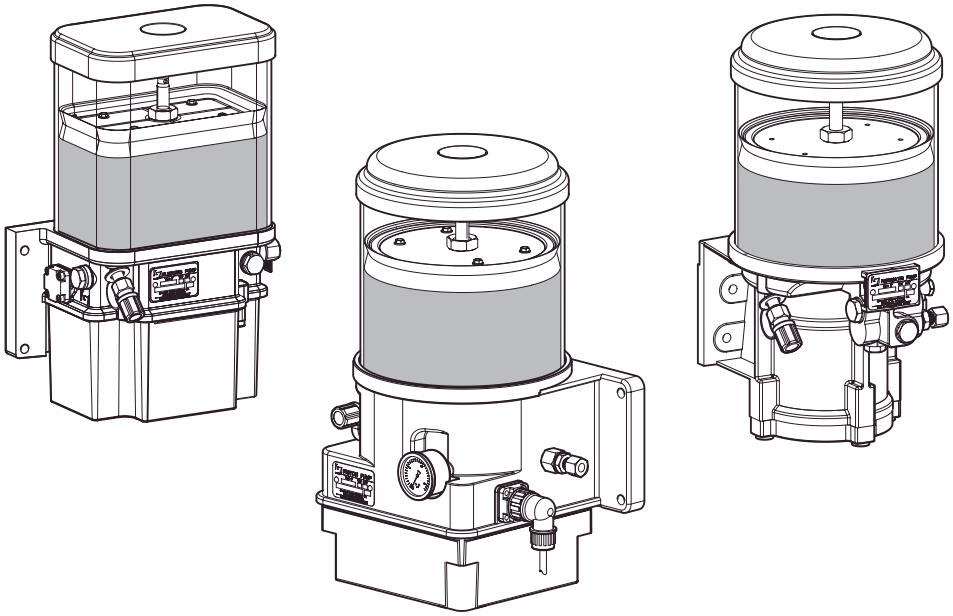
The reservoir (2) is made from impact-resistant plastic that can withstand the influences of fluctuating temperatures. The reservoir can hold a quantity of lubricant that in most cases is sufficient for about 4 months, depending on the number of grease points.
The minimum level (5 cm) is marked by a label (3) on the reservoir.

9.4 Follower plate

In the standard reservoir,a follower plate is placed above the level of the lubricant (Figure 9.3/1). This plate follows the level of the lubricant; as the level falls,the follower plate falls with it under the action of a tension spring. The follower plate prevents the increase of air into the lubricant and any consequent soaping of the lubricant. Funneling of grease as the level falls is also prevented. The follower plate also wipes the reservoir wall clean. This allows the level of the lubricant to be checked easily at a glance.

10.

REFILLING THE RESERVOIR



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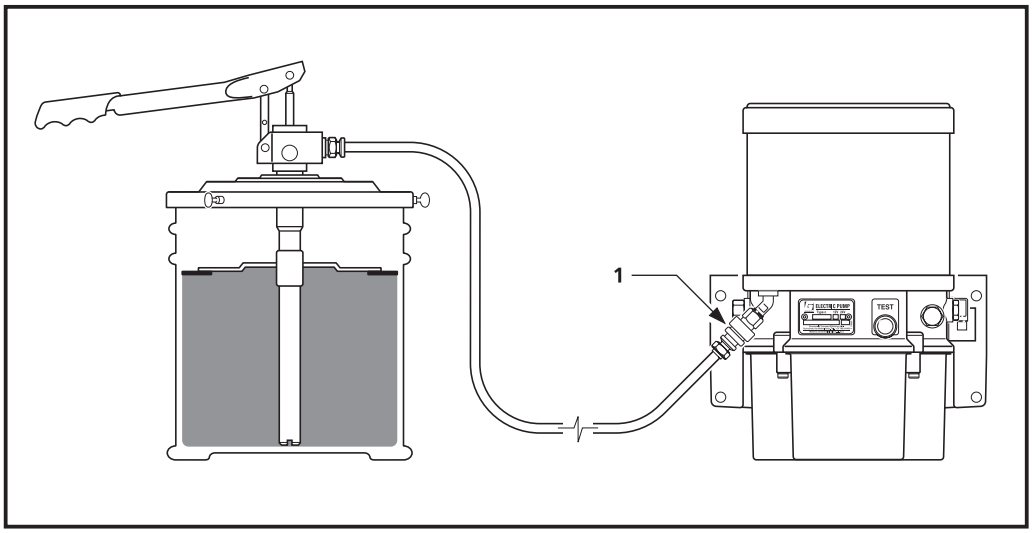


Figure 10.1 Filling the grease reservoir

When the lubricant in the reservoir has fallen to the minimum level it must be re-filled. Generally a filler pump is used for this purpose. The procedure (Figure 10.1) is as follows:

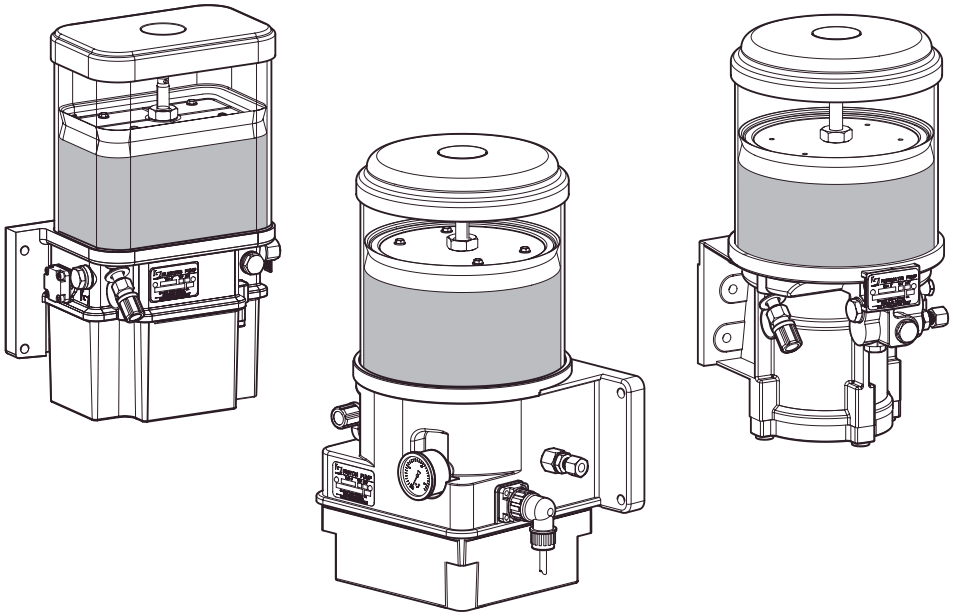
- With a new filler pump (or filling hose) the hose should first be primed with lubricant. This avoids the pumping of air into the reservoir. For this the ball (1) in the snap-on connector on the filler hose should be depressed while pumping lubricant through the hose until it is filled with the lubricant.
- Remove the dust cap from the filler connector.
- Carefully clean the filler connector and the connector on the filler hose.
- Secure the filler hose to the filler connector.
- Fill the reservoir to not more than the maximum level (2 cm below the top of the reservoir) or until the follower plate meets its stop.
- Replace the dust cap on the filler connector.
- There is a filter within the filler connector in the reservoir. If pumping is very difficult the filter could be blocked. In this case, dismantle and clean the filter.

Note:

Keep main pump raised from the bottom of grease pail, to ensure no plastic shavings enter the grease system.

11.

MAINTENANCE



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Maintenance of Groeneveld's Automatic Greasing System can be combined with normal vehicle or installation maintenance.

Check the pump, paying particular attention to:
- the level of the lubricant (top up in time),
- external damage.

Check the electronic timer with particular reference to the correct operation of the various functions.
For this an accelerated test should be carried out (see section 6).

Check the brake impulse counter and pay attention to the manometer on the pump.
Operate the brake impulse counter manually by means of the screw.

Check the entire system and in particular for:
- damage of tubing;
- operation of the metering units.

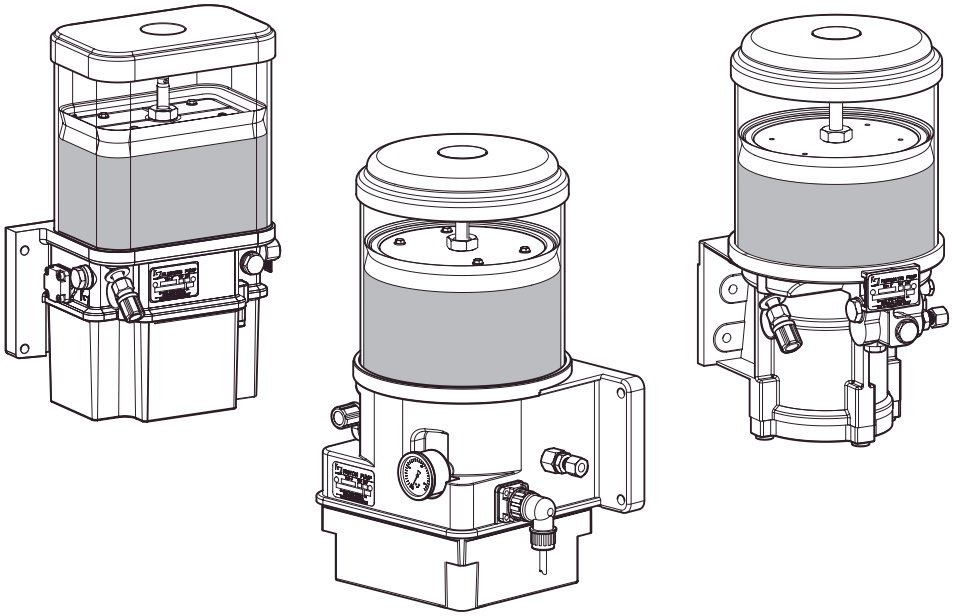
If a high pressure (steam) cleaner is used to clean the vehicle or installation, the lubrication system pump should be avoided to prevent any possible entry of water through the venting openings. Water will not enter under normal operating conditions.

REMARK:

When an automatic greasing system is used, time-consuming lubricating by hand is largely replaced. However, do not forget that, for example, the universal joints of the propeller shaft still have to be greased manually.

12.

FAULT DIAGNOSIS



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Fault	*Cause*	*Action*
1. All points to be lubricated are dry.	a. Pump reservoir is empty.	a. Fill the reservoir (see section 10).
	b. Reservoir filled with grease that is too thick and unsuitable for the system.	b. Remove and clean the reservoir. Refit and fill the reservoir with the correct grease. Remove the end plugs from the distribution blocks and pump the old grease out of the system.
	c. Main pipe leaking.	c. Repair the line and bleed the system if a new piece of piping has been fitted.
	d. Electronic timer, PLC or pneumatic impulse counter not set correctly.	d. Reset the electronic timer, PLC or brake impulse counter.
	If there is another cause, please consult your dealer.	
2. Pump does not work or does not reach working pressure.	a. Pneumatically-operated pump: No or too-low air pressure.	a. Ensure there is an air pressure of 90 to 125 psi.
	b. Piston does not rise.	b. Dismantle the cover of the pump casing and clean the piston.
	If there is another cause, please consult your dealer.	
3. One or more lubrication points are dry while the others receive sufficient grease.	a. Break in the secondary tubing.	a. Repair or replace the line.
	b. Inoperative metering unit.	b. Remove the metering unit and fit a new unit.
4. A lubrication point receives too much grease.	a. Internal leak in the metering unit.	a. Remove and clean the metering unit or fit a new unit.
5. Pneumatically-operated pump: Solenoid valve fails to operate or does not operate correctly.	a. Bad or open electrical connections.	a. Check the electrical circuit and connections to the solenoid valve. Check the valve with direct current bypassing the electronic timer. Watch out for short-circuits!
	b. Solenoid valve internally fouled with water and/or rust from the vehicle air system.	b. Dismantle, clean and refit the valve or fit a new valve. Clean the vehicle air system.

Fault	*Cause*	*Action*
6. Continuous buzzing from the electronic timer.	a. Short circuit.	a. Check wiring and test solenoid.
7. Electronic timer does not operate.	a. Fuse blown.	a. Fit new fuse.
8. Too much grease at all lubrication points.	a. System greasing frequency does not correspond with vehicle operating conditions.	b. Reduce the greasing frequency. Do not be too sparing, it is better to grease too much than too little.
9. Alarm buzzer in electronic timer sounds intermittently.	a. Grease level in the reservoir below the minimum. a. System not reaching working pressure. c. No cycle time interval selected on the electronic timer.	a. Fill the reservoir (see section 10). a. Top up the reservoir with grease and/or repair the main pipe, check the pump pressure with a manometer. c. Set a cycle time interval on the electronic timer.

Notes

Groeneveld Australia Pty. Ltd.
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